

means for selecting a block, said block containing an element selected from a group consisting of a formula and a figure, said element having a plurality of items, and each of said items being a component selected from a group consisting of a symbol, a parameter, a function, an operator, a label, and a curve;

means for creating identifications to distinguish among said items;

means for associating properties to said block and said items to specify desired relations among said items and desired ways of handling said block and said items;

means for modifying said properties to change said desired relations among said items and said desired ways of handling said block and said items;

means for defining new properties and means for assigning said new properties to said block and said items to provide specific requirements on said block and said items;

means for processing curve to separate curves, extract information from said curves, and generate information for recreating said curves;

means for processing formula to link functions, identify relations among components of a formula, create a reconstructed formula, and display said reconstructed formula;

means for displaying said block and said items;

means for displaying properties associated with said block and said items;

means for adjusting properties to be assigned to said block and said items by using information obtained from handling previous blocks;

means for generating said programming source code;

means for compiling, linking, and running said programming source code and displaying results from running said programming source code; and

means for updating database.

**22.** The system according to claim **21**, further comprising means for generating model file and means for modifying said model file, wherein said model file is a file that contains structure information of said programming source code.

**23.** The system according to claim **21**, further comprising:

means for associating default properties to said items and said block to specify default relations among said items and default ways of handling said items and said block; and

means for modifying said default properties associated with said items and said block to change said default relations and said default ways of handling said items and said block.

24. The system according to claim 21, further comprising means for adjusting and assigning properties to said previous blocks by making use of information accumulated for handling said block and said items that are under processing, said properties comprising any things associated with said items and needed for extracting information, said items comprising numbers, strings, mathematic symbols, parameters, constants, functions, equations, formulas, figures, and various components of a figure, whereby one property can bind many items, one item can bind many properties, and one property can further bind other properties.

25. The system according to claim 21, further comprising means for displaying and hiding selected aspects of said block and said items, wherein said aspects comprise properties and their associated information.

26. The system according to claim 21, wherein said means for processing curve comprises:

means for separating curves into a group of separated curves;

means for selecting a curve from said group of separated curves;

means for assigning properties to said curve to specify how to extract information from said curve and how to create a regenerated curve;

means for extracting parameters associated with said curve;

means for binding said parameters to said regenerated curve;

means for representing said curve by a plurality of ordered pairs; and

means for reconstructing said curve.

27. The system according to claim 26, wherein said means for reconstructing said curve comprises:

means for identifying if said curve is a continuous curve or a discrete curve;

means for identifying accurate marks on said curve;

means for specifying precision; and

means for specifying interpolation method and finding coefficients associated with said interpolation method from said plurality of ordered pairs.

**28.** The system according to claim **21**, said system comprising many commonly used functions in its libraries and said block comprising a formula, wherein said means for processing formula comprises:

means for assigning properties to said block and said items;

means for identifying mathematic symbols and functions in said block;

means for identifying relations among said items;

means for displaying said relations;

means for identifying any undefined functions;

means for searching from said libraries for library functions related to said undefined functions;

means for associating an undefined function with a corresponding library function and means for associating arguments of said undefined function with corresponding arguments of said corresponding library function;

means for changing parameters associated with said corresponding library function;

means for creating a regenerated formula;

means for displaying said regenerated formula; and

means for modifying properties of said formula, deleting properties of said formula, defining new properties, and adding said new properties to said formula.

**29.** The system according to claim **28**, wherein said means for identifying relations among said items comprises means for generating tokens by a scanner and means for creating symbol tables by a parser.

**30.** The system according to claim **28**, said formula comprising a function and said function having a plurality of variables and a plurality of parameters, further comprising means for assigning as many properties to said function, said variables, and said parameters as needed directly and indirectly, simultaneously and gradually, recursively and non-recursively.

**31.** The system according to claim **21**, wherein said means for displaying properties further comprises:

- means for displaying simultaneously all properties related to an item;
- mean for displaying sequentially all properties related to an item;
- means for displaying a particular property and all items related to said particular property;
- means for displaying property's property of an item; and
- means for displaying properties in any combination of above means.

**32.** The system according to claim **29**, wherein said means for generating tokens by a scanner, each of said token being an inseparable item associated with certain properties, said scanner being a two dimension processing in nature, whereby said scanner uses not only literal information from an item but also properties associated with said item as well as information obtained from handling other items and previous blocks.

**33.** The system according to claim **29**, wherein said means for generating symbol tables by a parser, said symbol tables being instances of data structures to describe relations among all items of a formula, said parser being a two dimension processing in nature, whereby said parser uses a grammar based on various mathematic structures and properties associated with said items, collects information about said items, and requires specific information from an intelligent source, and inserts extra items into said symbol tables to describe said formula effectively.

**34.** The system according to claim **21**, wherein said means for recognizing symbols, texts, formulas, and figures on said portions is arranged to apply pattern recognition techniques on said portions to identify said symbols, said texts, said formulas, and said figures; wherein said means for updating database further comprises means for selecting and saving model files and programming source code, means for converting data from one format into different formats and saving data in a desired format, means for creating help files, and means for maintaining database; and wherein said means for creating identifications creates new symbols from said symbols, new texts from said texts, new formulas from said formulas, and new figure

from said figures with each of said new symbols, each of said new texts, each of said new formulas, and each of said new figures having a corresponding identification.

**35.** A computing software system having common used functions in its libraries for a user to regenerate and verify contents in a document, said document comprising a plurality of formula blocks, said system comprising means for identifying said formula blocks, means for processing formula block, means for generating source code, means for compiling, linking and running said source code, and means for displaying results, wherein said means for processing formula block carried out for each of said formula blocks comprises:

- means for assigning properties to a formula block selected from said formula blocks and items of said formula block;

- means for identifying and selecting an undefined function in said formula block;

- means for searching for a corresponding library function in said libraries, and associating said undefined function with said corresponding library function;

- means for searching for a previously defined function and associating said undefined function with said previously defined function;

- means for identifying relations among said items to create a symbol table for said items;

- means for reconstructing said each block to create a corresponding regenerated block;

and

- means for displaying said regenerated block,

whereby functions in said formula blocks will be linked to corresponding functions in said libraries and corresponding functions defined previously,

whereby means for compiling, linking and running said source code will compile, link, and run said source code to regenerate said results,

whereby means for displaying results will display said results in proper forms, and

whereby said user can compare said results with said contents to verify said contents on said document.

**36.** The system according to claim 35, wherein said means for processing formula block further comprises:

means for modifying said properties to give descriptions more specific to said each block and said items; and

means for defining new properties to specify further requirements on said each block and said items.

**37.** The system according to claim **35**, wherein said means for processing formula block further comprises:

means for associating arguments of said undefined function with corresponding arguments of said corresponding library function;

means for specifying parameters associated with said corresponding library function; and

means for displaying properties associated with said regenerated block.

**38.** A computing software system having common used functions in its libraries for a user to regenerate and verify contents on a document, said document comprising a plurality of curve blocks, each of said curve blocks containing a plurality of curves, said system comprising means for identifying said curve blocks, means for processing curve block, means for generating source code, means for compiling, linking and running said source code, and means for displaying results, wherein said means for processing curve block carried out for each of said curve blocks comprises:

means for assigning properties to a curve block selected from said curve blocks and items of said curve block;

means for separating each curve from a group of curve in said curve block to generate a group of separated curves;

means for selecting one curve from a group of separated curves and specifying properties to said one curve;

means for identifying parameters associated with said one curve and binding said parameters with said one curve;

means for extracting information from said curve; and

means for representing said curve.